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Statistical Forecasting Models Used to Predict Daily Patient Volumes in the Emergency Department: A Proposal for a Systematic Review

Jon White, MS, BSN, RN, CCRN

Background: The existing and projected worldwide shortage of nurses requires numerous distinct solutions to prevent a healthcare crisis. Proposed solutions typically address the situation from different angles, including identifying ways to add new nurses to the workforce, or finding new ways to work with limited resources. This review examines the efficacy of forecasting demand in one area of the hospital, understanding the potential of its uses for short-term resource balancing and projection of need.

This systematic review will provide a current synopsis of the research published since the fall of 2007, expanding on Wargon and colleagues' *A systematic review of models for forecasting the number of emergency department visits*, published in 2009.

Purpose: Systematic review of the literature surveying statistical forecasting models used to predict daily patient volumes in the emergency department.

Design / Methods / Plan: A current survey of published studies designed to predict patient visits to the emergency department will be produced. Wargon and colleagues' 2009 review will be used as a template.

The PubMed database was searched for English language studies published between 23 September 2007 and 30 June 2017, using the criteria "emergency service[mh] AND (forecasting[all] OR scheduling) AND (simulation OR models, theoretical[mh])". Accessed 20 July 2017, this search retrieved 446 results. Excluded from the results were articles not considered research; research that was not forecasting emergency department visits; research that was not specific to models of forecasting; research of models forecasting admissions or using admission-related criteria; research of models forecasting surge and related events; long-term forecasting of trends used for strategic purposes; forecasting focused on a specific population (i.e., pediatrics); and forecast models that focus solely on external events or data such as holidays, weather, etc. This resulted in a selection of 20 published research articles to include in the review. The reference lists of these selected articles were then scanned for research that was not previously discovered and which did not meet the aforementioned exclusion criteria. This resulted in the addition of four more review articles.

Results: TBD

Timeframe: TBD. Completion ideally in summer/fall of 2018, dependent on recruitment of required team members. Proposed team includes minimum of one, preferably two statisticians, along with one additional registered nurse or 'functional expert'. This team will comprise the group who will complete the systematic review for publication.